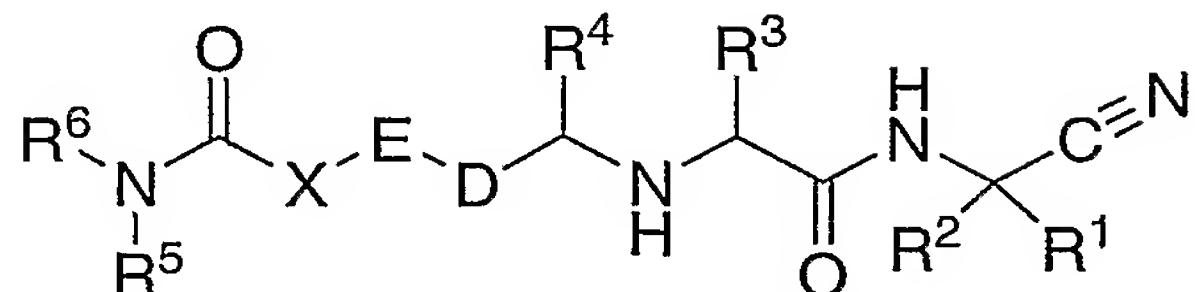


WHAT IS CLAIMED IS:

1. A compound of the formula:



wherein R¹ is hydrogen, C₁₋₆ alkyl or C₂₋₆ alkenyl wherein said alkyl and alkenyl groups are optionally substituted with one to six halo, C₃₋₆ cycloalkyl, -SR⁷, -SOR⁷, -SO₂R⁷, -SO₂CH(R^a)(R^b), -OR⁷, -N(R⁷)₂, aryl, heteroaryl or heterocyclyl wherein said aryl, heteroaryl and heterocyclyl groups are optionally substituted with one or two substitutents independently selected from C₁₋₆ alkyl, halo, hydroxyalkyl, hydroxy, alkoxy or keto;

R² is hydrogen, C₁₋₆ alkyl or C₂₋₆ alkenyl wherein said alkyl and alkenyl groups are optionally substituted with one to six halo, C₃₋₆ cycloalkyl, -SR⁷, -SOR⁷, -SO₂R⁷, -SO₂CH(R^a)(R^b), -OR⁷, -N(R⁷)₂, aryl, heteroaryl or heterocyclyl wherein said aryl, heteroaryl and heterocyclyl groups are optionally substituted with one or two substitutents independently selected from C₁₋₆ alkyl, halo, hydroxyalkyl, hydroxy, alkoxy or keto;

or R¹ and R² can be taken together with the carbon atom to which they are attached to form a C₃₋₈ cycloalkyl or heterocyclyl ring wherein said ring system is optionally substituted with one or two substituents independently selected from C₁₋₆ alkyl, hydroxyalkyl, haloalkyl or halo;

R³ is C₁₋₆ alkyl or C₂₋₆ alkenyl, wherein said alkyl and alkenyl groups are optionally substituted with C₃₋₆ cycloalkyl or one to six halo;

R⁴ is C₁₋₆ alkyl substituted with 1-6 halo;

R⁵ is selected from hydrogen or C₁₋₃ alkyl;

D is aryl or heteroaryl, wherein said aryl or heteroaryl group, which may be monocyclic or bicyclic, is optionally substituted on either the carbon or the heteroatom with one to five substituents independently selected from C₁₋₆ alkyl, haloalkyl, halo, keto, alkoxy, -SR⁷, -OR⁷, N(R⁷)₂, -SO₂R⁷ or -SO₂R^a;

E is aryl or heteroaryl, wherein said aryl or heteroaryl group, which may be monocyclic or bicyclic, is optionally substituted on either the carbon or the heteroatom with one to five substituents independently selected from C₁-6 alkyl, haloalkyl, halo, keto, alkoxy, -SR⁷, -OR⁷, N(R⁷)₂ or -SO₂R⁷;

X is CR^aR^b or C₃-8 cycloalkyl;

R⁷ is selected from hydrogen, C₁-6 alkyl, aryl, aryl(C₁-4)alkyl, heteroaryl, heteroaryl(C₁-4)alkyl, C₃-8cycloalkyl, C₃-8cycloalkyl(C₁-4)alkyl, and heterocycl(C₁-4)alkyl wherein said groups can be optionally substituted with one, two, or three substituents independently selected from halo, alkoxy, cyano, -NR^aR^b, -SR^a or -SO_mR^a;

R⁶ is selected hydrogen, C₁-6 alkyl, C₃-8 cycloalkyl, heterocycl, heteroaryl, cyano, halo, alkoxy, OR^a, -NR^a, -SR^a or -SO_mR⁵; wherein said alkyl, cycloalkyl, heterocycl and heteroaryl groups can be optionally substituted with one, two, or three substituents independently selected from halo, cyano or -OR^a;

R^a is hydrogen or C₁-6 alkyl which is optionally substituted with one, two, or three substituents independently selected from halo or -OR⁵;

R^b is hydrogen or C₁-6 alkyl which is optionally substituted with one, two, or three substituents independently selected from halo or -OR⁵;

m is an integer from zero to two;

or a pharmaceutically acceptable salt or stereoisomer thereof.

2. The compound of Claim 1 wherein wherein R¹ is hydrogen, R² is hydrogen, or R¹ and R² can be taken together with the carbon atom to which they are attached to form a C₃-8 cycloalkyl ring.

3. The compound of Claim 2 wherein R³ is C₁-6 alkyl optionally substituted with one to six halo.

4. The compound of Claim 3 wherein D is aryl.

5. The compound of Claim 4 wherein D is phenyl.

6. The compound of Claim 4 wherein X is C₃-8 cycloalkyl.

7. The compound of Claim 6 wherein X is cyclopropyl.

8. The compound of Claim 1 selected from:

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclopropyl)-2'-fluorobiphenyl-4-yl)-2,2,2-trifluoroethyl]-4-fluoro-L-leucinamide;

N^2 -[(1S)-1-(4-{5-[1-(aminocarbonyl)cyclopropyl]pyridin-2-yl}phenyl)-2,2,2-trifluoroethyl]- N^1 -(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N^2 -((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]biphenyl-4-yl}-2,2-difluoroethyl)- N^1 -(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-1-(4'-{[(1R,2R)-2-[cyclopropylamino]carbonyl]cyclopropyl}biphenyl-4-yl)-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclopropyl)biphenyl-4-yl)-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N^2 -((1S)-1-{4'-[1-(azetidin-1-ylcarbonyl)cyclopropyl]biphenyl-4-yl}-2,2-difluoroethyl)- N^1 -(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -{(1S)-2,2-difluoro-1-[4'-(1-{[(2,2,2-trifluoroethyl)amino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -((1S)-1-{4'-[2-(cyclopropylamino)-2-oxoethyl]biphenyl-4-yl}-2,2-difluoroethyl)-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-2,2-difluoro-1-(4'-{1-[isopropylamino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl]-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-2,2-difluoro-1-(4'-{1-[pyridin-3-ylamino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl]-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -{(1S)-2,2-difluoro-1-[4'-(1-{[(2-hydroxyethyl)amino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -{(1S)-2,2-difluoro-1-[4'-(1-{[(1-methylcyclopropyl)amino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -{(1S)-2,2-difluoro-1-[4'-(1-{[(2,2,2-trifluoro-1-methylethyl)amino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -{(1S)-2,2-difluoro-1-[4'-(1-{[(2-fluorocyclopropyl)amino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N^1 -(1-cyanocyclopropyl)- N^2 -[(1S)-2,2-difluoro-1-(4'-{1-[1,3-thiazol-2-ylamino]carbonyl}cyclopropyl)biphenyl-4-yl]ethyl]-4-fluoro-L-leucinamide;

N^2 -{(1S)-1-[4'-(2-amino-1,1-difluoro-2-oxoethyl)biphenyl-4-yl]-2,2,2-trifluoroethyl}- N^1 -(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclopropyl)biphenyl-4-yl]-2,2,2-trifluoroethyl]-4-fluoro-L-leucinamide;

N¹-(cyanomethyl)-N²-[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclopropyl)biphenyl-4-yl]-2,2,2-trifluoroethyl]-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]-2'-fluorobiphenyl-4-yl}-2,2,2-trifluoroethyl)-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclopropyl)biphenyl-4-yl]-2,2-difluoroethyl]-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-2,2-difluoro-1-[4'-(1-{{(2,2,2-trifluoroethyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]biphenyl-4-yl}-2,2-difluoroethyl)-N¹-(1-cyanocyclopropyl)-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[cyclopropylamino]carbonyl}cyclobutyl)biphenyl-4-yl]-2,2,2-trifluoroethyl]-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclobutyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)-N¹-(cyanomethyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclobutyl]biphenyl-4-yl}-2,2-difluoroethyl)-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-1-[4'-(1-{(1-cyanocyclopropyl)amino}carbonyl)cyclopropyl)biphenyl-4-yl]-2,2-difluoroethyl}-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-2,2-difluoro-1-(4'-{1-[(methoxyamino)carbonyl]cyclopropyl)biphenyl-4-yl}ethyl)-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-2,2-difluoro-1-[4'-(1-{{(methoxy(methyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-2,2-difluoro-1-[4'-(1-{{(hydroxyethyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(dimethylamino)carbonyl]cyclopropyl)biphenyl-4-yl}-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(cyclobutylamino)carbonyl]cyclopropyl)biphenyl-4-yl}-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-((1S)-2,2-difluoro-1-{4'-[1-(pyrrolidin-1-ylcarbonyl)cyclopropyl]biphenyl-4-yl}ethyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-2,2-difluoro-1-[4'-(1-{{(methoxy(methyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-2,2-difluoro-1-[4'-(1-{{(methoxyethyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-((1S)-2,2-difluoro-1-{4'-[1-(morpholin-4-ylcarbonyl)cyclopropyl]biphenyl-4-yl}ethyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-2,2-difluoro-1-(4'-{1-[(methylamino)carbonyl]cyclopropyl}biphenyl-4-yl)ethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-1-[4'-(1-{{(cyclopropylmethyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]-2,2-difluoroethyl}-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-2,2-difluoro-1-(4'-{1-[(propylamino)carbonyl]cyclopropyl}biphenyl-4-yl)ethyl]-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-1-[4'-(1-{{(cyanomethyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]-2,2,2-trifluoroethyl}-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-4-fluoro-N²-{(1S)-2,2,2-trifluoro-1-[4'-(1-{{(methylsulfonyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-L-leucinamide;

N²-[(1S)-1-(4'-{1-[(tert-butylamino)carbonyl]cyclopropyl}biphenyl-4-yl)-2,2,2-trifluoroethyl]-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-((1S)-1-{4'-[2-(cyclopropylamino)-1,1-dimethyl-2-oxoethyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(cyclopropylamino)carbonyl]cyclopropyl}-3'-fluorobiphenyl-4-yl)-2,2,2-trifluoroethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(cyclopropylamino)carbonyl]cyclopropyl}biphenyl-4-yl)-2,2,2-trifluoroethyl]-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(cyclopropylamino)carbonyl]cyclopropyl}-3'-fluorobiphenyl-4-yl)-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-((1S)-1-{4'-[2-(cyclopropylamino)-1,1-dimethyl-2-oxoethyl]biphenyl-4-yl}-2,2-difluoroethyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-[(1S)-1-(4'-{1-[(cyclopropylamino)carbonyl]cyclopropyl}-2'-fluorobiphenyl-4-yl)-2,2-difluoroethyl]-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-4-fluoro-N²-{(1S)-2,2,2-trifluoro-1-[4'-(1-{{(2-fluorocyclopropyl)amino}carbonyl}cyclopropyl)biphenyl-4-yl]ethyl}-L-leucinamide;

N²-[(1S)-1-(4-{5-[1-(aminocarbonyl)cyclopropyl]-3-chloropyridin-2-yl}phenyl)-2,2,2-trifluoroethyl]-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4-(3-chloro-5-{1-[(cyclopropylamino)carbonyl]cyclopropyl}pyridin-2-yl)phenyl]-2,2,2-trifluoroethyl}-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N¹-(1-cyanocyclopropyl)-N²-{(1S)-1-[4-(5-{1-[(cyclopropylamino)carbonyl]cyclopropyl}pyridin-2-yl)phenyl]-2,2,2-trifluoroethyl}-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)-N¹-(cyanomethyl)-4-fluoro-L-leucinamide;

N²-[(1S)-1-(4-{5-[1-(aminocarbonyl)cyclopropyl]pyridin-2-yl}phenyl)-2,2,2-trifluoroethyl]-N¹-(cyanomethyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(2-amino-1-methyl-2-oxoethyl)biphenyl-4-yl]-2,2,2-trifluoroethyl}-N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(R)-2-amino-1-methyl-2-oxoethyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(S)-2-amino-1-methyl-2-oxoethyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(2-amino-1-methyl-2-oxoethyl)-2'-fluorobiphenyl-4-yl]-2,2,2-trifluoroethyl}- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4-[5-(2-amino-1-methyl-2-oxoethyl)pyridin-2-yl]phenyl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(2-amino-1-methyl-2-oxoethyl)-2'-fluorobiphenyl-4-yl]-2,2-difluoroethyl}- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(R)-2-amino-1-methyl-2-oxoethyl]-2'-fluorobiphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(S)-2-amino-1-methyl-2-oxoethyl]-2'-fluorobiphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(S)-2-amino-1-methyl-2-oxoethyl]-2-bromobiphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1(S)-2-amino-1-methyl-2-oxoethyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-5-hydroxy-L-leucinamide;

1-(4'-{(1S)-1-[((1S)-1-{[(1-cyanocyclopropyl)amino]carbonyl}-3,3,3-trifluoropropyl)amino]-2,2,2-trifluoroethyl}biphenyl-4-yl)cyclopropanecarboxamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)vinyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-((1S)-1-{4'-[1-(aminocarbonyl)cyclopropyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-L-norvalinamide;

N²-((1S)-1-{4'-[1-(2-amino-2-oxoethyl)cyclopropyl]biphenyl-4-yl}-2,2,2-trifluoroethyl)- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(3-amino-2,2-dimethyl-3-oxopropyl)biphenyl-4-yl]-2,2,2-trifluoroethyl}- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(2-amino-2-oxoethyl)-2'-fluorobiphenyl-4-yl]-2,2,2-trifluoroethyl}- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;

N²-{(1S)-1-[4'-(2-amino-2-oxoethyl)biphenyl-4-yl]-2,2,2-trifluoroethyl}- N¹-(1-cyanocyclopropyl)-4-fluoro-L-leucinamide;
or a pharmaceutically acceptable salt or stereoisomer thereof.

9. A pharmaceutical composition comprising a compound according to Claim 1 and a pharmaceutically acceptable carrier.

10. The use of a compound of Claim 1 in the preparation of a medicament useful for the treatment of: osteoporosis, glucocorticoid induced osteoporosis, Paget's disease, abnormally increased bone turnover, periodontal disease, tooth loss, bone fractures, rheumatoid arthritis, osteoarthritis, periprosthetic osteolysis, osteogenesis imperfecta, obesity, metastatic bone disease, hypercalcemia of malignancy or multiple myeloma in a mammal in need thereof a therapeutically effective amount of a compound according to Claim 1.

11. A pharmaceutical composition comprising a compound of Claim 1 and another agent selected from the group consisting of: an organic bisphosphonate, an estrogen receptor modulator, an estrogen receptor beta modulator, an androgen receptor modulator, an inhibitor of osteoclast proton ATPase, an inhibitor of HMG-CoA reductase, an integrin receptor antagonist, or an osteoblast anabolic agent, and the pharmaceutically acceptable salts and mixtures thereof.

12. The use of a compound of Claim 1 and another agent selected from the group consisting of: an organic bisphosphonate, an estrogen receptor modulator, an androgen receptor modulator, an inhibitor of osteoclast proton ATPase, an inhibitor of HMG-CoA reductase, an integrin receptor antagonist, an osteoblast anabolic agent, and the pharmaceutically acceptable salts and mixtures thereof, in the preparation of a medicament useful for the treatment of: osteoporosis, glucocorticoid induced osteoporosis, Paget's disease, abnormally increased bone turnover, periodontal disease, tooth loss, bone fractures, rheumatoid arthritis, osteoarthritis, periprosthetic osteolysis, osteogenesis imperfecta, obesity, metastatic bone disease, hypercalcemia of malignancy or multiple myeloma in a mammal in need thereof.